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SPECIFICATION FOR FERRO-ALLOYS FOR WELDING INDUSTRY

(First Revision)

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 3 *April* 1981

AMENDMENT NO. 1 MAY 1983

TO

IS : 7148-1980 SPECIFICATION FOR FERRO-ALLOYS FOR WELDING INDUSTRY

(First Revision)

Addendum

[*Page* 5, *Table* 1, *Sl No.* (iv)] — Add the following new grade in 'Low carbon ferro-chromium':

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
iv)	Low carbon ferro-chromium	III	0·05 to 0·1	1·5, *Max*	0·03	0·03	—	—	—	60 to 67	—	—	—	—

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SPECIFICATION FOR FERRO-ALLOYS FOR WELDING INDUSTRY

(First Revision)

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Indian Standard

SPECIFICATION FOR FERRO-ALLOYS FOR WELDING INDUSTRY

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 21 October 1980, after the draft finalized by the Ferro Alloys Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard was first published in 1973. In this revision, limits for sulphur and carbon in ferromolybdenum have been relaxed in light of the experience gained during this period.

0.3 This standard covers various grades of ferro-alloys used for the manufacture of electrode paste for welding electrodes. Ferrosilicon and ferromanganese powder are susceptible to disintegration and hence have to be supplied in the passivated condition. Appendix A gives the passivation requirements and the method for determination of passivity.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements of ferro-alloys used in the manufacture of welding electrodes.

2. SUPPLY OF MATERIAL

2.1 General requirements for the supply of material shall be in accordance with IS : 1387-1967†.

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*Rules for rounding off numerical values (*revised*).

†General requirements for the supply of metallurgical materials (*first revision*).

3. CHEMICAL COMPOSITION

3.1 The chemical composition of all ferro-alloys except ferroniobium when determined in accordance with the method given in IS : 1559-1961* shall conform to Table 1.

3.1.1 An Indian Standard for methods of chemical analysis of ferroniobium is under preparation. Till that standard is published, the methods of chemical analysis shall be as agreed to between the purchaser and the manufacturer.

4. SIZE

4.1 Sieve analysis of the material shall be as given below:

Sieve Size (*see* IS : 460-1962†)	*Material Retained* (Percent by weight)
355-micron	0
63-micron	50, *Min*
45-micron	75, *Min*

5. PASSIVATION TEST REQUIREMENTS

5.1 The requirements of passivation test shall apply only to ferrosilicon and ferromanganese.

5.2 Passivation test shall be carried out in accordance with the method given in Appendix A and the results obtained shall conform to the requirements specified in **5.2.1**.

5.2.1 For effective passivation, the gas evolved at 40°C shall be within the following limits:

After 30 minutes	1·0 ml, *Max*
After 45 minutes	1·5 ml, *Max*
After 60 minutes	2·0 ml, *Max*

6. PACKING AND MARKING

6.1 The material shall be packed in suitable containers and shall be marked with the following:

a) Manufacturer's name or trade-mark, and

b) Grade.

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*Methods of chemical analysis of ferro-alloys.

†Specification for test sieves (*revised*).

AMENDMENT NO. 1 MAY 1983
TO
IS : 7148-1980 SPECIFICATION FOR FERRO-ALLOYS FOR WELDING INDUSTRY

(First Revision)

Addendum

[*Page* 5, *Table* 1, *Sl No.* (iv)] — Add the following new grade in 'Low carbon ferro-chromium':

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
iv)	Low carbon ferro-chromium	III	0·05 to 0·1	1·5, *Max*	0·03	0·03	—	—	—	60 to 67	—	—	—	—

(SMDC 8)

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TABLE 1 CHEMICAL COMPOSITION OF FERRO-ALLOYS FOR WELDING INDUSTRY

(*Clause* 3.1)

Sl No.	Ferro-Alloy	Grade	Composition, Percent											
			Carbon	Silicon	Sulphur, *Max*	Phosphorus, *Max*	Manganese	Aluminium	Titanium	Chromium	Molybdenum	Vanadium	Niobium (Columbium)	Others
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
i)	Low carbon ferromanganese	I	0·05, *Max*	1·00, *Max*	0·01	0·08	85 to 90	—	—	—	—	—	—	—
		II	0·30, *Max*	1·5, *Max*	0·05	0·20	80 to 85	—	—	—	—	—	—	—
	High carbon ferromanganese	—	6 to 8	1·5, *Max*	0·05	0·35	78 to 82	—	—	—	—	—	—	—
ii)	Ferrosilicon	—	0·10, *Max*	45 to 50	0·02	0·04	—	1·0, *Max*	—	—	—	—	—	—
iii)	Ferrotitanium	I	0·10, *Max*	2 to 3	0·03	0·10	—	2·0, *Max*	30, *Min*	—	—	—	—	—
		II	0·10, *Max*	2·0, *Max*	0·03	0·10	—	4 to 6	40, *Min*	—	—	—	—	Total impurities 0·2, *Max*
		III	0·10, *Max*	0·30, *Max*	0·03	0·03	—	3·5, *Max*	40, *Min*	—	—	—	—	—
iv)	Low carbon ferrochromium	I	0·025, *Max*	0·5, *Max*	0·01	0·03	—	—	—	70 to 75	—	—	—	—
		II	0·05 to 0·1	1·5, *Max*	0·03	0·03	—	—	—	67 to 75	—	—	—	—
	High carbon ferrochromium	I	4 to 6	1·5, *Max*	0·03	0·05	—	—	—	60 to 70	—	—	—	—
		II	6 to 8	4·0, *Max*	0·03	0·05	—	—	—	60 to 70	—	—	—	—
v)	Ferromolybdenum	I	0·03, *Max**	1·5, *Max*	0·08	0·05	—	0·50, *Max*	—	—	65 to 75	—	—	Copper, 0·5 *Max*
		II	0·03, *Max**	1·5, *Max*	0·08	0·05	—	0·50, *Max*	—	—	55 to 65	—	—	Copper, 0·2 *Max*
vi)	Ferrovanadium	—	0·10, *Max*	0·25, *Max*	0·05	0·05	—	1·50, *Max*	—	—	—	50 to 55	—	—
vii)	Low carbon ferroniobium (ferrocolumbium)	—	0·1, *Max*†	3·0, *Max*	0·05	0·05	2·0, *Max*	2·0, *Max*	3·0, *Max*	—	—	—	60 to 70	Tantalum, 6·0 *Max*
viii)	Ferrotungsten	—	1·0, *Max*	0·5 *Max*	0·06	0·07	0·5, *Max*	—	—	—	—	—	—	Tungsten 74 to 82

*If agreed to by the manufacturer and user, the carbon content may be relaxed to 0·1 percent maximum.

†For special applications, carbon may be limited to 0·03 percent maximum.

6.1.1 The material may also be marked with the Standard Mark.

6.1.2 The use of the Standard Mark is governed by the provisions of Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

7. SAMPLING

7.1 The material shall be sampled in accordance with IS : 1472-1977*.

APPENDIX A

(*Clauses* 0.3 *and* 5.2)

PASSIVATION TEST

A-1. GENERAL

A-1.1 The passivation test outlined below shall be conducted only after ensuring that the powder under investigation meets the requirements of chemical composition and sieve analysis.

A-1.2 Ferrosilicon or ferromanganese powder is said to be passivated when the rate at which it reacts (evolving gas) in an alkaline medium is within the requirements laid down. The degree of passivation is inversely proportional to the amount of gas evolved and it may be measured (at any temperature) as the ratio of the volume of gas evolution specified to the volume of gas actually evolved by the sample.

A-2. OUTLINE OF THE METHOD

A-2.1 Five grams of ferrosilicon or ferromanganese powder is reacted with a 90 : 10 mixture of potassium silicate and potassium hydroxide. The gas evolved is collected in a graduated tube and recorded at intervals of time.

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*Methods of sampling ferro-alloys, for determination of chemical composition (*first revision*).

A-3. PROCEDURE

A-3.1 The arrangement of apparatus for the gas evolution test is shown in Fig. 1.

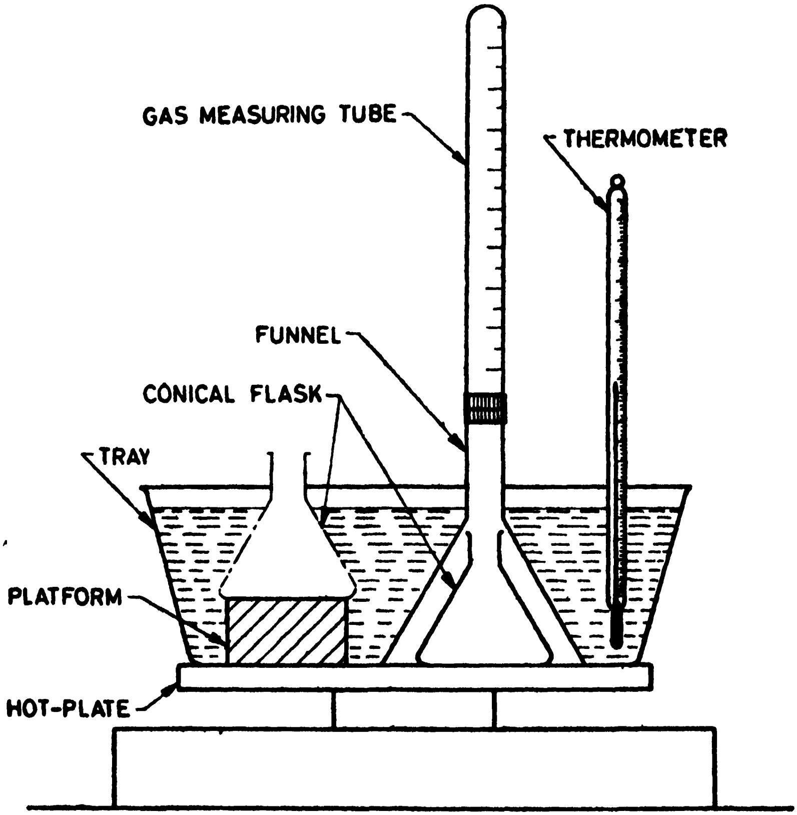

Fig. 1 Arrangement of Apparatus for Gas Evolution Test

A-3.2 One 100-ml gas-measured tube with a funnel connected to it, is placed in a tray filled with water so that the funnel is entirely immersed in water. Air is completely exhausted out of the measuring tube through a rubber hose as a result of which the tube will be completely filled with water. The tray shall be placed on a hot-plate so as to regulate the temperature of water at 40°C. If the ambient temperature is higher than 40°C, the tray shall be placed in an outer enclosure in which water at a lower temperature is circulating. The temperature of water in the inner tray shall be regulated to within ±1°C. The temperature is measured with the help of a thermometer.

A-3.3 One conical flask of 100-ml capacity is filled with a mixture of 90 ml potassium silicate (sp gr 1·34) and 10 ml of potassium hydroxide solution and placed on a platform inside the water tray for 30 minutes so that the mixture attains the same temperature as the water-bath.

A-3.4 Five grams of ferrosilicon or ferromanganese powder are now added to the liquid mixture in the flask and the flask is carefully moved under the funnel. Care should be taken to see that no air bubbles enter the gas measuring tube.

A-3.5 The amount of gas evolved after intervals of 30, 45 and 60 minutes is recorded from the gas measuring tube.

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